Online Learning Prototype for Higher Education

Hery Harjono Muljo
Accounting
Bina Nusantara University
Jakarta, Indonesia
heryhm@binus.edu

Anzaludin Samsinga Perbangsa
School of Information System
Bina Nusantara University
Jakarta, Indonesia
aperbangsa@binus.edu

Bens Pardamean
Master in Computer Science Program
Bina Nusantara University
Jakarta, Indonesia
bpardamean@binus.edu

***Abstract*—Online learning provides a unique learning experience for users as it enhances interactivity, time and place flexibility, the potential to reach a global audience, and easy updating of content as well as achievable capabilities and reduces education costs. Online produces an effective and efficient learning process. All of them are the benefits generated but not yet fully utilized by the higher education. Data collection techniques were conducted by distributing questionnaires and interviews. Result analysis for model development used Unified Model Language (UML) tool that utilized Use Case Diagram. Learning Management System (LMS) application development to build e-learning application employed open source software MOODLE (Modular Object-Oriented Dynamic Learning Environment) 2.5. Measuring tool to gauge the level of readiness and acceptance of the application of online learning model used Technology Acceptance Model (TAM) with 5 constructs that were perceived Ease of Use, Perceived Usefulness, Attitude Toward Using, Behavior Intention to Use, and Actual Usage Behavior. Results showed most lecturers and students agreed that the online learning model developed was easy to use, can increase work performance, have the intention to use, the tendency to keep using, and can be realized.**

Keywords—online learning; Use Case Diagram; Unified Model Language; Learning Management System; Technical Acceptance Model

I. INTRODUCTION

A. History of Online Learning

The 1980s and 1990s represent years of innovation for the world of education in expanding online networks at all levels of education. The presence of the World Wide Web in 1992, generates great opportunities for online learning as it becomes more accessible and creates new pedagogical models. The Web also brings multimedia and extends the range of disciplines offered online [1]. The presence of electronic education Computer-Based Training (CBT) in the late eighties and nineties was regarded as the foundation of e-Learning [2].

In the 21st century, the world of education focuses on the quality of education both in-class lectures and online by making the most of the existing technology. In addition, it focuses on developing innovations to motivate, inspire and educate students [3]. Online learning is a form of education that is growing rapidly and is viewed positively by universities, especially in the USA. This is seen in 2011 as many as 65% of institutions stated that online learning is very important for long-term strategic planning [4].

Online learning has been popular among college worlds. It appears that most higher education institutions use e-learning [5]. Online learning also provides realistic and accessible learning opportunities for low-performing students and increasing population growth [6].

B. Advantage of Online Learning

In the world of education, online learning provides many benefits such as improving their experience in learning, student-centered, and learning without being hindered by place and time [7]. From the point of view of efficiency and effectiveness of online learning, the benefits include reducing travel and work time significantly and can be implemented with more participants [8]. The student is very flexible in managing study time, determining learning location and speed of learning [9].

Compared to traditional classrooms, online learning is more easily monitored, and learners are given the opportunity to interact with many people via e-mail [10] and for slow learners who benefit greatly because they have more time to understand [11]. For learners who are able to hone their own learning skills, they can use time management, review material regularly, and seek help from either the professors or co-workers [12].

Online learning materials are easy to update and the use of multimedia that leads to learning can be strengthened through the use of video, audio, quiz and other forms of interaction and provide quick feedback and learners can tailor learning materials to meet their needs [13] [14].

C. Challenge of Online Learning

The development of online learning is also faced with challenges. Educators are faced with rapid technological advances and time commitments to maintain the sustainability of online learning processes [15]. In addition, it should be able to develop and determine what methods are appropriate to run online learning [16]. The consequences of online learning result in the formation of feelings of isolation due to a lack of sense of belonging to the community [17] [18]. The most common disruptions are communication and technical disruption [19] [20].

D. Literature Review

The essential components of online learning are innovative teaching strategies, design courses specific to online learning, and the development of good online teaching skills [21]. Online learning not only changes the nature of teaching and learning, but also the nature of an effective assessment process [22] and self-regulation became an important factor affecting the success of online learners [23].

Thus, universities, especially institutions with open access, need to take steps to ensure that online learning learners can perform well as face-to-face learning [24]. If there are cultural differences derived from different national cultures it does not negatively impact on the online learners' experience, but rather, it is seen as a potential factor contributing to a rich cultural learning experience [11].

Some universities in Indonesia have not utilized the service of online learning to the fullest. Utilization is limited to the distribution of lecture materials, task collection, and procurement of quiz. This is unfortunate because online learning can provide more benefits in supporting the learning process. Looking at the above conditions, need to create a model of online learning that is suitable and can be utilized by universities and also a research question in this research.

II. METHODOLOGY

A. Analysis and design method

Data collection technique is done by distributing questionnaires to lecturers and students. Based on the results of the questionnaire, conducted data analysis using descriptive analysis. The goal is to know what features and functions are desired, and know the response. After that, the interview process is divided into 4 groups: experience using e-learning, perceived benefits, constraints or limitations, and e-learning features.

Based on the results of the analysis, the model design was developed using the Unified Model Language (UML) tool that is Use Case Diagram and the next development of Learning Management System (LMS) application to build e-learning application using open source software Moodle 2.5.

Development results are evaluated by distributing questionnaires to lecturers and students who are the target users of the online learning model. The measuring instrument used to measure the level of readiness and acceptance of the online learning model is Technology Acceptance Model (TAM). using 5 collisions perceived Ease of Use, Perceived Usefulness, Attitude Toward Using, Behavior Intention to Use, and Actual Usage Behavior.

B. Population and sample

The population of this study is students and lecturers of high school in Medan who have followed the online learning lecture system. Questionnaires were distributed in 7 different places and samples taken for each place were 30 respondents. Thus the total questionnaire that has been spread as many as 210 questionnaires.

III. RESULTS

A. Online Learning Model

At the development stage, the model produces use case diagrams and class diagrams. Use case diagrams describe user groups and what features they will use. Use case diagrams are depicted in Figure 1.

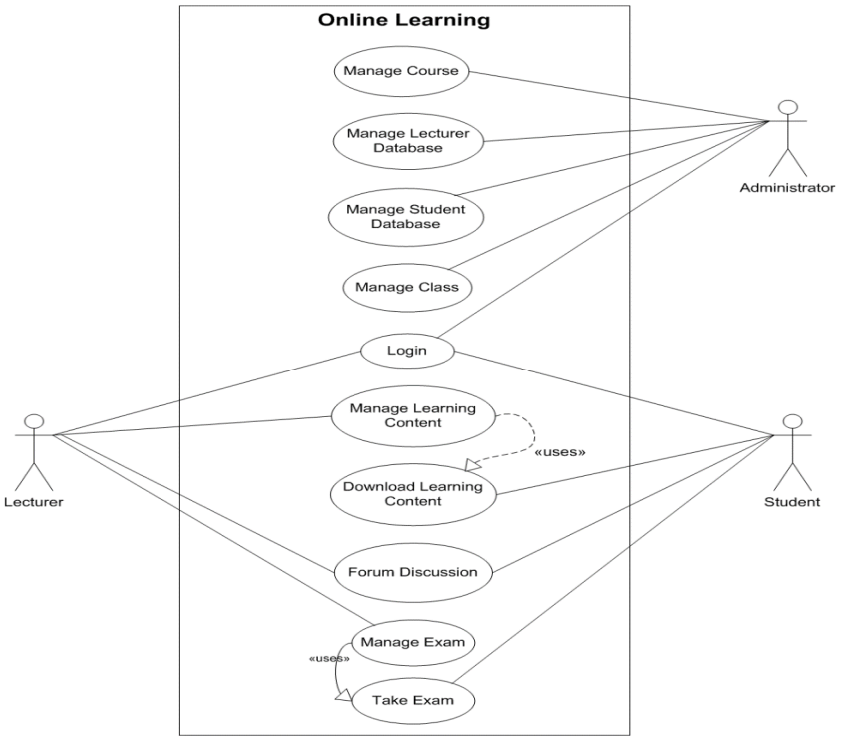

Fig. 1. Use Case Diagram

Use case Login describes the user authentication activities in order to use online learning services according to their access rights. Use case Manage Course describes the activities of entering the data subject that will be presented in online learning. Use case Manage Class describes the activity of input data of a class, lecturer, and student which will be included in online learning in that class.

Class diagrams describe entities that will be managed data in the system and the relationship between the class sat with another class. Class diagrams are depicted in figure 2.

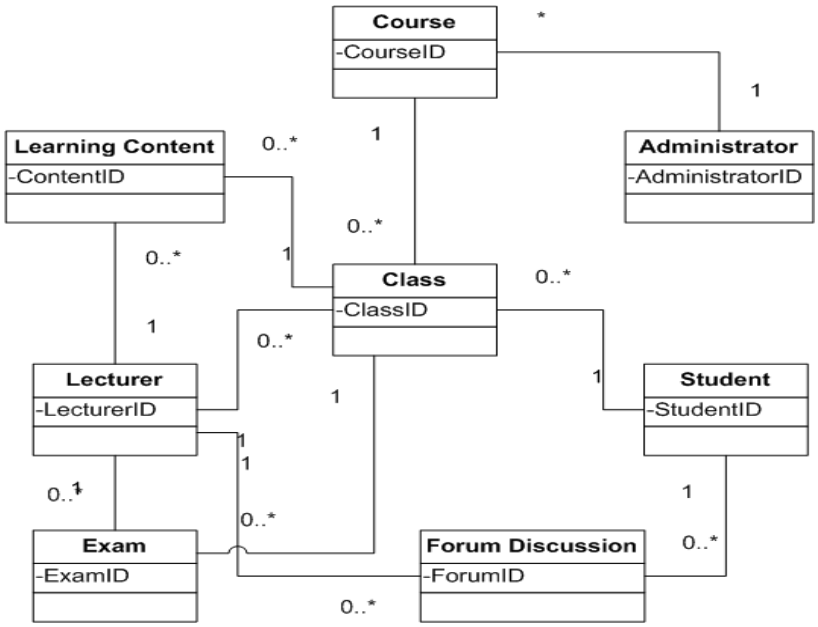

Fig. 2. Class Diagram

Figure 2 illustrates entity Administrator can open multiple courses, while a lecturer can prepare a lot of learning content. A student can enroll in many classes, discuss with a lecturer, and can take many exams.

Technology Acceptance Model (TAM) is used to analyze, explain and measure the factors that influence the acceptance of the online learning model. The TAM constructs used in this study are Perceived Ease of Use, Perceived Usefulness, Attitude Toward Using, Behavior Intention to Use, Actual Usage Behavior. The following descriptive data respondents answer each dimension:

TABLE I. DESCRIPTIVE STATISTICS OF TECHNOLOGY ACCEPTANCE MODEL (TAM)

Questions	Lecturer Response		Student Response	
	Agree Percentage	*Disagree Percentage*	*Agree Percentage*	*Disagree Percentage*
Perceived Ease of Use				
1. LMS is easy to use	177 **90.8%**	18 **9.23%**	189 **90.0%**	21 **10.0%**
2. Impressive menu design	178 **91.3%**	17 **8.72%**	196 **93.3%**	14 **6.7%**
3. Make it easy to interact	181 **92.8%**	14 **7.18%**	197 **93.8%**	13 **6.2%**
4. LMS is realized	176 **90.3%**	19 **9.74%**	198 **94.3%**	12 **5.7%**
Perceived Usefulness				
1. Improve effectiveness	171 **87.7%**	24 **12.31%**	193 **91.9%**	17 **8.1%**
2. Get the required information	164 **84.1%**	31 **15.90%**	201 **95.7%**	9 **4.3%**
3. Improve quality	167 **85.6%**	28 **14.36%**	196 **93.3%**	14 **6.7%**
4. Help speed up the work	166 **85.1%**	29 **14.87%**	192 **91.4%**	18 **8.6%**

Questions	Lecturer Response		Student Response	
	Agree Percentage	*Disagree Percentage*	*Agree Percentage*	*Disagree Percentage*
Attitude toward Using				
1. Login authorization	188 **96.4%**	7 **3.6%**	197 **93.8%**	13 **6.2%**
2. Antivirus Installation	183 **93.8%**	12 **6.2%**	194 **92.4%**	16 **7.6%**
3. Personal identification	190 **97.4%**	5 **2.6%**	196 **93.3%**	14 **6.7%**
Behavior Intention to Use				
1. Use apps for communication	170 **87.2%**	25 **12.8%**	184 **87.6%**	26 **12.4%**
2. Suggest to friends	185 **94.9%**	10 **5.1%**	183 **87.1%**	27 **12.9%**
3. Invite friends to interact	183 **93.8%**	12 **6.2%**	188 **89.5%**	22 **10.5%**
4. Real-time Communication	180 **92.3%**	15 **7.7%**	170 **81.0%**	40 **19.0%**
Actual Usage Behavior				
1. Satisfaction with application performance	189 **96.9%**	6 **3.1%**	192 **91.4%**	18 **8.6%**
2. The model is good idea	192 **98.5%**	3 **1.5%**	187 **89.0%**	23 **11.0%**
3. Daily access	195 **100.0%**	0 **0.0%**	197 **93.8%**	13 **6.2%**

Perceived Ease of Use Constructions. Both lecturers and students dominated with agree answers of more than 90% results. This proved that online learning was easy to use, easy to interact, and easy to realize and not a burden for lecturers and students. In addition, it showed the trust of lecturers and students for the use of online learning that was able to reduce one's effort in carrying out the learning process because it was easier to operate and use by lecturers and students. The result of statistical test t-test with probability level p = 0,05 showed that t = 0.274 < t table = 0.793. It can be concluded that there was no significant difference between lecturers and students related to response to the ease of use online learning model. Thus, the lecturers and students agreed that the online learning model was easy to use.

Perception of Perceived Usefulness. This construct was a phase where one believes that the user of a particular system would be able to increase one's work performance. The respondents were more likely to agree than disagree, as evidence showed over 80% of respondents agreed with the answer of each question. Thus, it can be concluded that lecturers and students believed that online learning would increase work performance because it improved effectiveness, improved quality, obtained the required information and helped speed up the execution of tasks. The result of statistical test t-test with probability level p = 0,05 showed that t = -2.850 < t table = 0.005. It can be concluded that there was no significant difference between the response of lecturers and students related responses to the usability of the use of online learning model. Thus, both lecturers and students believed that the online learning model was very useful.

Construct Attitude Toward Using. This construct measured the user's intent to use the technology. Over 90% of respondents agreed with the answers of questionnaire. It meant that lecturers and students agreed to use the online learning model assuming the user receives authorization at login, installs an antivirus to add computer security and they get personal identification when using this model. The result of t-test statistic with probability level p = 0,05 showed that t = 0.810 < t table = 0.856. Thus, it can be concluded there was no significant difference between the response of lecturers and students related responses to the accepting attitude of the online learning model.

Construct Behavior Intention to Use. Behavior tends to keep up with technology usage. The agreed answers were to dominate at each point of the questionnaire with more than 80% agree. This meant that lecturers and students showed the intention to use the online learning model. The result of t-test statistic with probability level p = 0,05 showed that t = 0.769 > t table = 0.442. So, it can be concluded that there was a significant difference between the response of lecturers and students to the intention to use the online learning model.

Construct Actual Usage Behavior. Both lecturers and university students agreed, by more than 80%, that they satisfied with the performance of this application, this model was good for online learning, and it can be implemented. Thus, users would likely to access the system as often. Based on t-test statistic test with probability level p = 0,05 showed that t = 0.2496 > t table = 0.013. Therefore, it can be concluded, there was a significant difference between the response of lecturers and students related to the response to real conditions in using the online learning model.

IV. CONCLUSION

The development of online learning model, developed based on the utilization that has not been utilized optimally, especially in Indonesia, and also as the answer to the research question that the proposed model is a suitable online learning

prototype and can be utilized by universities. Based on the results of the evaluation using TAM approach consisting of five constructs, showed that most of lecturers and students agreed that online learning model developed were easy to use, can increase work performance, have the intention to use, tendency to keep using, and can be realized model online learning.

REFERENCES

[1] L. Harasim, "Shift happens: Online education as a new paradigm in learning," The Internet and higher education, vol. 3, no. 1–2, pp. 41–61, 2000.

[2] L. Eger, Technologie vzdělávání dospělých. 1.vyd., Plzeň: Západočeská univerzita, 2005.

[3] H. E. Kentnor, "Distance Education and the Evolution of Online Learning in the United States," Curriculum and Teaching Dialogue, vol. 17, no. 2, pp. 21–34, 2015.

[4] E. Allen and J. Seaman, "Going the distance: Online education in the United States," The Online Learning Consortium, 2011. [Online]. Available: http://sloanconsortium.org/publications/survey.

[5] J. Stöter, M. Bullen, O. Zawacki-Richter and C. von Prümmer, From the back door into the mainstream – the characteristics of lifelong learners, Athabasca, Edmonton, Canada: Athabasca University Press, 2014.

[6] J. Scherer, Special report: Virtual high schools, San Diego, CA: Distance-Educator.com, 2006.

[7] B. Holmes and J. Gardner, E-Learning: Concepts and Practice, London: SAGE Publications, 2006.

[8] J. R. Evans and I. M. Haase, "Online business in the twenty-first century: An analysis of potential target markets," Internet Research: Electronic Networking Applications Policy, vol. 11, no. 3, pp. 246-260, 2001.

[9] C. Evans and P. F. Fan, "Lifelong learning through the virtual university," Campus-Wide Information Systems, vol. 19, no. 4, 2002.

[10] E. Kahiigi, "Exploring the E-learning State of Art," The Electronic Journal of e-Learning, vol. 6, no. 2, pp. 77-88, 2007.

[11] R. Elango, V. K. Gudep, and M. Selvam, "Quality of e-Learning: An Analysis Based on e-Learners' Perception of e-Learning," The Electronic Journal of e-Learning, vol. 6, no. 1, pp. 31–44, 2008.

[12] J. W. You and M. Kang, "The role of academic emotions in the relationship between perceived academic control and self-regulated learning in online learning," Computers & Education, vol. 77, pp. 125–133, 2014.

[13] D. Kirsh, "E-learning, metacognition and visual design," in International Conference on Advances in Infrastructure for e-Business, e-Education, e-Science, and eMedicine on the internet, L'Aquila, 2002.

[14] M. Turk and G. Robertson, "Perceptual user interfaces (introduction)," Communications of the ACM, vol. 43, no. 3, pp. 32-34, 2000.

[15] M. M. Mitchell and C. Delgado, "Online Learning: Advantages and Challenges in Implementing an Effective Practicum Experience," Open Journal of Nursing, vol. 4, no. 6, pp. 379–384, 2014.

[16] J. R. Brunet, "Interaction and Activity Into the Course," Distance Learn, vol. 8, no. 3, pp. 35–40, 2011.

[17] S. Vonderwell, "An examination of asynchronous communication experiences and perspectives of students in an online course: A case study," Internet and Higher Education, vol. 6, pp. 77-90, 2003.

[18] R. H. Woods, "How much communication is enough in online courses? Exploring the relationship between frequency of instructor-initiated personal email and learners' perceptions of and participation in online learning, " International Journal of Instructional Media, vol. 29, no. 4, pp. 377-394, 2002.

[19] C. Essex and K. Cagiltay, "Evaluating an online course: Feedback from "distressed" students," Quarterly Review of Distance Education, vol. 2, no. 3, pp. 233-239, 2001.

[20] N. Hara and R. Kling, "Students' distress with a Web-based distance education course: An ethnographic study of participants' experiences," Information, Communication and Society, vol. 3, no. 4, pp. 557-579, 2000.

[21] P. Jacobs, "The challenges of online courses for the instructor," Research in Higher Education Journal, vol. 21, pp. 1–18, 2013.

[22] K. Swan, J. Shen, and S. R. Hiltz, "Assessment and Collaboration in Online Learning," Journal of Asynchronous Learning Networks, vol. 10, no.1, pp. 45–62, 2006.

[23] E. Yukselturk and S. Bulut, "Predictors for Student Success in an Online Course," Journal of Educational Technology & Society, vol. 10, no. 2, pp. 71-83, 2007.

[24] S.S. Janggars,"Examining the effectiveness of online learning within a community college system: An instrumental variabel approach," 2013.